

Appl. No. 09/994,294
Amendment Dated May 10, 2004
Reply to Office Action of Feb. 9, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in this application.

Listing of Claims:

Claim 1 (currently amended) A fan propeller having a hub and plural circumferentially spaced blades, each of said blades having a leading edge, a peripheral rim or tip and a trailing edge with respect to the direction of rotation, at least selected ones of said blades including ~~a roughened portion of~~ plural trips formed at or near said trailing edge of said selected ones of said blades, respectively, said trips including surfaces extending substantially normal to a pressure side surface of said selected ones of said blades to reduce tonal acoustic emissions generated by said fan propeller during rotation thereof.

Claim 2 (canceled)

Claim 3 (currently amended) The fan propeller set forth in Claim 2 1 wherein:

~~said roughened portion extends~~ trips extend generally from said peripheral tip inwardly toward said hub along said trailing edge.

Claim 4 (canceled)

Claim 5 (withdrawn) The fan propeller set forth in Claim 1 wherein:

said roughened portion is provided by a strip of material adhered to said selected ones of said blades, respectively.

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Claim 6 (withdrawn) The fan propeller set forth in Claim 1 wherein:

said roughened portion is provided by plural serrations formed on said selected ones of said blades, respectively.

Claim 7 (withdrawn) The fan propeller set forth in Claim 1 wherein:

said roughened portion is provided by intersecting serrations formed on said selected ones of said blades, respectively.

Claim 8 (withdrawn) The fan propeller set forth in Claim 1 wherein:

said roughened portion comprises an upturned portion of said selected ones of said blades, respectively, at said trailing edge.

Claim 9 (withdrawn) The fan propeller set forth in Claim 1 wherein:

said roughened portion comprises an offset part of said selected ones of said blades, respectively, including said trailing edge.

Claim 10 (currently amended) The fan propeller set forth in Claim 1 wherein:

the height of said ~~roughened portion~~ trips is substantially equal to the thickness of a laminar boundary layer of air flowing over said pressure side surface of said selected ones of said blades during operation of said fan propeller.

Claim 11 (currently amended) A fan propeller having a hub and plural circumferentially spaced blades, each of said blades having a leading edge, a blade tip and a trailing edge with respect to the direction of rotation of said fan propeller, at least selected ones of said blades including a roughened portion

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of a pressure side surface of said selected ones of said blades to reduce tonal acoustic emissions generated by said fan propeller during rotation thereof, said roughened portion being provided by one or more laminar flow boundary layer trips formed at or near said trailing edge of said selected ones of said blades, respectively, said trips are provided by plural spaced apart planar surfaces formed on said selected ones of said blades, respectively, and extending at an angle to said pressure side surfaces, respectively.

Claim 12 (original) The fan propeller set forth in Claim 11 wherein:

said trips extend generally from said blade tip inwardly toward said hub along said trailing edge of said selected ones of said blades, respectively.

Claim 13 (withdrawn) The fan propeller set forth in Claim 11 wherein:

said trips are provided by a strip of material adhered to said selected ones of said blades, respectively.

Claim 14 (canceled)

Claim 15 (canceled)

Claim 16 (original) The fan propeller set forth in Claim 11 wherein:

the height of said trips is substantially equal to the thickness of a laminar boundary layer of air flowing over said pressure side surface of said selected ones of said blades during operation of said fan propeller.

Claim 17 (withdrawn) A heat exchanger unit including a cabinet, a heat exchanger mounted at said cabinet, and a motor driven fan for forcing airflow over said heat exchanger, said

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fan including a fan propeller having a hub and plural circumferentially spaced blades, each of said blades having a leading edge, a peripheral rim and a trailing edge with respect to the fan propeller direction of rotation, at least selected ones of said blades including a roughened portion of a blade pressure side surface of said selected ones of said blades for reducing tonal acoustic emissions generated by said fan propeller during rotation thereof, said roughened portion being provided by one or more laminar boundary layer trips formed at or near said trailing edges of said selected ones of said blades, respectively.

Claim 18 (withdrawn) The heat exchanger unit set forth in Claim 17 wherein:

said trips extend generally from said rim inwardly toward said hub along said trailing edge of said selected ones of said blades, respectively.

Claim 19 (withdrawn) The heat exchanger unit set forth in Claim 18 wherein:

said trips are provided by plural surfaces formed on and integral with said selected ones of said blades, respectively, said plural surfaces extending from and at an angle with respect to said blade surfaces, respectively.

Claim 20 (withdrawn) The heat exchanger unit set forth in Claim 19 wherein:

the height of said trips is substantially equal to the thickness of a laminar boundary layer of air flowing over said blade surfaces of said selected ones of said blades during operation of said fan propeller.

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Claim 21 (new) The fan propeller set forth in Claim 1 wherein:

said trips are spaced apart and said surfaces extending substantially normal to said pressure side surface are substantially parallel to each other.

Claim 22 (new) The fan propeller set forth in Claim 1 wherein:

said trips are staggered along said trailing edge of said selected ones of said blades, respectively.

Claim 23 (new) The fan propeller set forth in Claim 22 wherein:

said trips are provided in two rows extending along said trailing edge, said trips are of different lengths and the trips of one row overlap gaps between the trips of an adjacent row.

Claim 24 (new) The fan propeller set forth in Claim 1 wherein:

said trips are provided by one of coining, stamping and punching said selected ones of said blades to provide said surfaces extending substantially normal to said pressure side surfaces, respectively.

Claim 25 (new) The fan propeller set forth in Claim 11 wherein:

said trips are spaced apart and said surfaces extending at an angle to said pressure side surface are substantially parallel to each other.

Claim 26 (new) The fan propeller set forth in Claim 11 wherein:

said trips are staggered along said trailing edge of said selected ones of said blades, respectively.

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Claim 27 (new) The fan propeller set forth in Claim 26 wherein:

said trips are provided in two rows extending along said trailing edge, said trips are of different lengths and the trips of one row overlap gaps between the trips of an adjacent row.

Claim 28 (new) The fan propeller set forth in Claim 11 wherein:

said trips are provided by one of coining, stamping and punching said selected ones of said blades to provide said surfaces extending at an angle to said pressure side surfaces, respectively.